WHAT IS CLAIMED IS:

1. A display device comprising

a display panel including a plurality of pixels, each of the pixels including: a pixel portion for executing display in accordance with a write voltage; and a data memory portion for converting a write voltage equivalent to any one of white and black represented by a tone level of a normal display area into a write voltage corresponding to any one of brightest white display and darkest black display in the pixel portion, and for holding the converted write voltage,

wherein normal display is carried out with the write voltage represented by the tone level of the normal display area, and static image display is carried out with the write voltage, which is held in the data memory portion and corresponds to any one of the brightest white display and the darkest black display in the pixel portion.

2. The display device according to claim 1, further comprising:

a driver for supplying the write voltage represented by the tone level of the normal display area to the pixel portion and the data memory portion.

3. The display device according to claim 1, wherein said display panel includes:

an array substrate having a pluralities of signal lines and scanning lines disposed in a matrix form; a pixel electrode formed for each lattice of the matrix form; a pixel switching element provided for each lattice to electrically connect each of the signal lines and the pixel electrode with each other by a scanning signal supplied to each of the scanning lines to write video data supplied to each of the signal lines into the pixel electrode; a data memory

portion provided for each lattice to hold binary data to be written into the pixel electrode;

a counter substrate having a common counter electrode disposed oppositely to the pixel electrode with a predetermined gap interposed therebetween; and

a display layer held between the array substrate and the counter substrate,

and the data memory portion converts video data equivalent to any one of white and black represented by the tone level of the normal display area into binary data corresponding to any one of the brightest white display and the darkest black display in the pixel portion, and holds the binary data.

4. The display device according to claim 3, wherein the data memory portion includes:

two inverters connected in a loop form;

a data holding switching element for controlling electrical connection of the loop connection; and

two data taking-out switching elements for controlling electrical connection between the pixel portion and the data memory portion.

5. The display device according to claim 3, wherein the display layer is a liquid crystal layer.

6. A method for driving a display device, the display device being specified in claim 4, comprising:

in normal display, turning on the pixel switching element at a predetermined cycle; and writing video data supplied to each of the signal lines into the pixel electrode, and

in static image display, converting video data equivalent to any one of white and black represented by the tone level of the normal display area, the video data being supplied to each of the signal lines, into binary data corresponding to any one of the brightest white display and the darkest black display in the pixel portion; holding the binary data in the data memory portion; alternately turning on the two data taking-out switching elements for each frame; taking out the binary data different in polarity for each frame from the data memory portion, and writing the binary data in the pixel electrode.

7. The method for driving a display device according to claim 6, wherein a potential of the counter electrode voltage is reversed in accordance with a cycle of writing the binary data different in polarity for each frame in the pixel electrode.

8. The method for driving a display device according to claim 6, wherein in the case of the normal display, horizontal line reversal driving is carried out to set a polarity of signal voltages written in the pixels on a horizontal line opposed to that of signal voltages written in the pixels on a horizontal line adjacent thereto, and to reverse the polarities of the signal voltages for each frame, and in the case of the static image display, frame reversal driving is carried out to reverse polarities of signal voltages written in all the pixels for each frame.

9. A display device comprising:

a display panel including a plurality of pixels, each of the pixels including: a pixel portion for executing display in accordance with a tone level of a write voltage; a data conversion unit for selecting a write voltage

equivalent to any one of white and black represented by a tone level of a normal display area based on a threshold voltage, and converting the selected write voltage into a write voltage corresponding to any one of a brightest white display and a darkest black display in the pixel portion; and a data memory portion for holding the write voltage converted by the data conversion unit,

wherein normal display is carried out with the write voltage represented by the tone level of the normal display area, and static image display is carried out with the write voltage, which is held in the data memory portion and corresponds to any one of the brightest white display and the darkest black display in the pixel portion.

10. The display device according to claim 9, wherein said display panel includes:

an array substrate having a pluralities of signal lines and scanning lines disposed in a matrix form; a pixel electrode formed for each lattice of the matrix form; a pixel switching element provided for each lattice to electrically connect each of the signal lines and the pixel electrode with each other by a scanning signal supplied to each of the scanning lines to write video data supplied to each of the signal lines into the pixel electrode; a data memory portion provided for each lattice to hold binary data to be written into the pixel electrode; a data conversion unit for selecting video data represented by the tone level of the normal display area based on a threshold voltage and for converting the selected video data into binary data corresponding to any one of the brightest white display and the darkest black display in the pixel portion;

a counter substrate having a common counter electrode disposed oppositely to the pixel electrode with a predetermined gap interposed therebetween; and

a display layer held between the array substrate and the counter substrate.

11. The display device according to claim 10,

wherein the data conversion unit includes: a voltage holding circuit for holding a voltage in accordance with a potential difference between input side and output side and for increasing or decreasing a voltage held in the output side in accordance with voltage variation occurring in the input side; a binary data generation circuit for generating binary data corresponding to any one of the brightest white display and the darkest black display in the pixel portion in accordance with reference voltage variation caused in the input side of the voltage holding circuit by the video data represented by the tone level of the normal display area; a switching circuit for controlling electrical connection between the input side and the output side of the binary data generation circuit; and a reference voltage setting circuit for holding a reference voltage in the input side of the voltage holding circuit,

and the data memory portion includes two inverters connected in a loop form, a data holding switching element for controlling electrical connection of the loop connection, and two data taking-out switching elements for controlling electrical connection between the pixel portion and the data memory portion.

12. The display device according to claim 11, wherein the data conversion unit is disposed between the pixel portion and the data memory portion.

13. The display device according to claim 11, wherein the binary data generation circuit includes a CMOS circuit, selects voltage variation occurring in the input side of the voltage holding circuit based on increase or decrease in a voltage of the output side of the voltage holding circuit with respect to the threshold voltage, and outputs one of high and low power supply voltages supplied as power supply voltages for the CMOS circuit as binary data corresponding to any one of a brightest white display and a darkest black display in the pixel portion.

14. The display device according to claim 11, wherein the output side of the voltage holding circuit holds a voltage, which is substantially intermediate between the high and low power supply voltages supplied as power supply voltages for the CMOS circuit, as a threshold voltage for the CMOS circuit, and the threshold voltage is set by using the switching circuit to electrically connect the input side and the output side of the binary data generation circuit with each other.

15. The display device according to claim 13,

wherein the output side of the voltage holding circuit holds a threshold voltage for operating the binary data generation circuit,

a low power supply voltage is outputted from the binary data generation circuit as binary data corresponding to any one of the brightest white display and the darkest black display in the pixel portion when voltage variation occurring in the input side of the voltage holding circuit increases a voltage of the output side of the voltage holding circuit more than the threshold voltage, and

a high power supply voltage is outputted from the binary data

generation circuit as binary data corresponding to any one of the darkest black display and the brightest white display in the pixel portion when voltage variation occurring in the input side of the voltage holding circuit decreases a voltage of the output side of the voltage holding circuit below the threshold voltage.

16. The display device according to claim 9, wherein the display layer is a liquid crystal layer.

17. A method for driving a display device, the display device being specified in claim 9, comprising:

in normal display, turning on the pixel switching element at a predetermined cycle; and writing video data supplied to each of the signal lines in the pixel electrode, and

in static image display, converting video data represented by the tone level of the normal display area, the video data being supplied to each of the signal lines, into binary data corresponding to any one of the brightest white display and the darkest black display in the pixel portion at the data conversion unit, holding the binary data in the data memory portion; alternately turning on the two data taking-out switching elements for each frame to take out binary data different in polarity for each frame from the data memory portion; and writing the binary data into the pixel electrode.

18. The method for driving a display device according to claim 17, wherein in the case of the static image display, in a frame where a potential of the counter electrode voltage has a polarity identical to that of a potential of the counter electrode voltage when binary data is held in the data memory portion, one of the two data taking-out switching elements is turned on to

take out the binary data from one inverter of the data memory portion, and in a frame where a potential of the counter electrode voltage has a polarity reverse to that of a potential of the counter electrode voltage when binary data is held in the data memory portion, the other of the two data taking-out switching elements is turned on to take out the binary data from the other inverter of the data memory portion.

19. The method for driving a display device according to claim 17, wherein in the case of the normal display, horizontal line reversal driving is carried out to set a polarity of signal voltages written in the pixels on a horizontal line opposed to that of signal voltages written in the pixels on a horizontal line adjacent thereto and to reverse the polarities of the signal voltages for each frame, and in the case of the static image display, frame reversal driving is carried out to reverse polarities of signal voltages written in all the pixels for each frame.